

# MD DNR Vertical Water Quality Profiler Project 2019

Metadata also available as - [[Parseable text](#)] - [[XML](#)]

## Metadata:

- [Identification Information](#)
  - [Data Quality Information](#)
  - [Spatial Data Organization Information](#)
  - [Spatial Reference Information](#)
  - [Entity and Attribute Information](#)
  - [Distribution Information](#)
  - [Metadata Reference Information](#)
- 

### *Identification Information:*

#### *Citation:*

##### *Citation Information:*

##### *Originator:*

Maryland Department of Natural Resources, Resource Assessment Service (MD DNR RAS)

*Publication Date:* 20200220

*Title:* MD DNR Vertical Water Quality Profiler Project 2019

*Geospatial Data Presentation Form:* Spatial dataset

#### *Description:*

##### *Abstract:*

Water quality was monitored at a site in Harris Creek, a tributary of the Choptank River and the site of a large-scale oyster restoration project. A vertical profiling system (YSI 6951), equipped with a YSI (6600V2-4) data sonde, was used to sample seven environmental parameters: water temperature, specific conductance, dissolved oxygen concentration, oxygen percent saturation, pH, turbidity, and fluorescence. Salinity and chlorophyll were derived from specific conductance and fluorescence, respectively. Depth below the water surface was also recorded with each set of sonde readings. Profiles were conducted hourly, with measurements recorded at approximate 0.5 meter depth intervals throughout the entire water column. Total depth at this station measured between 2.5-3.0 meters.

##### *Purpose:*

Harris Creek is a tributary of the Choptank River, located on Maryland's Eastern Shore of the Chesapeake Bay. A designated oyster sanctuary, Harris Creek is the site of a large-scale oyster restoration project conducted by the Maryland Department of Natural Resources (MD DNR), the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Army Corps of Engineers (USACE). The 2019 MD DNR Vertical Water Quality Profiler Project characterized the vertical and temporal variability of water quality at a single site in Harris Creek. Data from the project will help fisheries managers better understand how water quality affects the settlement of oyster larvae as well as the growth and survival of juvenile oysters.

During the 2019 monitoring season, the MD DNR Shallow Water Monitoring Program deployed two additional continuous monitors at locations upstream and downstream of the vertical profiler. The monitors at stations XFG6431 (upstream) and XFG2810 (downstream) were positioned at a fixed depth 0.3 meters above the creek bottom. Together, data from all three stations are used to characterize the temporal and spatial variability of water quality along the length of Harris Creek.

##### *Supplemental Information:*

Prior to performing each hourly profile, the profiler data sonde collected a surface water reading while resting in a parked position at 1.0 meter depth. The hourly surface readings from the profiler sonde are reported as part of the MD DNR Continuous Water Quality Monitoring Project for 2019. The data collected at the two additional monitoring sites in Harris Creek (stations XFG6431 and XFG2810) are also

included in the MD DNR Continuous Water Quality Monitoring Project. Citation information for the 2019 MD DNR Continuous Water Quality Monitoring Project is provided in the Cross Reference portion of this metadata record.

Generally, the data sonde for the profiler was exchanged with a freshly calibrated sonde bi-weekly. When the data sonde was exchanged, water samples were collected for laboratory analysis of chlorophyll  $\alpha$ , phaeophytin, total suspended solids, and alkalinity. At the same time, Secchi disk depth was measured and a HydroLab (series III or IV) water quality sonde was used to collect discrete water temperature, salinity, dissolved oxygen, and pH data. Light attenuation was also measured using a LI-COR instrument. The data collected during field visits can be accessed through the Chesapeake Bay Program CIMS DataHub:

[<<http://www.chesapeakebay.net/data/index.htm>>]. Alkalinity data are available through the Eyes on the Bay web site: [<<http://eyesonthebay.dnr.maryland.gov/contmon/HarrisCreekAlkalinity.cfm>>].

Site visits were conducted following the protocols of the MD DNR Shallow Water Monitoring Program.

Detailed descriptions of the field and laboratory procedures can be found in the following documentation:

1) "MDDNR Continuous Water Quality Monitoring Project Metadata" for 2019 can be found using publication type 'Metadata' to search the 'Monitoring News and Reports' page of the Eyes on the Bay website <<http://eyesonthebay.dnr.maryland.gov/eyesonthebay/stories.cfm>>

2) "Quality Assurance Project Plan for the Maryland Department of Natural Resources, Chesapeake Bay Shallow Water Quality Monitoring Program, for the period July 1, 2019 - June 30, 2020", can be found using publication type 'Quality Assurance Project Plan' to search the 'Monitoring News and Reports' page of the Eyes on the Bay website

<[http://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/SWM\\_QAPP\\_2019\\_2020\\_Draft\\_v3.pdf](http://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/SWM_QAPP_2019_2020_Draft_v3.pdf)>

*Time\_Period\_of\_Content:*

*Time\_Period\_Information:*

*Range\_of\_Dates/Times:*

*Beginning\_Date:* 20190305

*Ending\_Date:* 20191220

*Currentness\_Reference:* Ground condition

*Status:*

*Progress:* Complete

*Maintenance\_and\_Update\_Frequency:* As needed

*Spatial\_Domain:*

*Bounding\_Coordinates:*

*West\_Bounding\_Coordinate:* -76.303383

*East\_Bounding\_Coordinate:* -76.303383

*North\_Bounding\_Coordinate:* 38.743233

*South\_Bounding\_Coordinate:* 38.743233

*Keywords:*

*Theme:*

*Theme\_Keyword\_Thesaurus:*

Global Change Master Directory (GCMD). 2020. GCMD Keywords, Version 9.1 Greenbelt, MD: Earth Science Data and Information System, Earth Science Projects Division, Goddard Space Flight Center (GSFC) National Aeronautics and Space Administration (NASA). [URL (GCMD Keyword Forum Page): <https://earthdata.nasa.gov/gcmd-forum>]

*Theme\_Keyword:*

Earth Science > Biosphere > Ecosystems > Marine Ecosystems > Estuary

*Theme\_Keyword:*

Earth Science > Biosphere > Ecosystems > Marine Ecosystems > Reef > Oyster Reef

*Theme\_Keyword:*

Earth Science > Human Dimensions > Habitat Conversion/Fragmentation > Eutrophication

*Theme Keyword:*

Earth Science > Human Dimensions > Habitat Conversion/Fragmentation >  
Reclamation/Revegetation/Restoration

*Theme Keyword:*

Earth Science > Biosphere > Ecological Dynamics > Ecosystem Functions > Primary Production

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Surface Water > Surface Water Chemistry

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Surface Water > Surface Water Processes/Measurements  
> Water Depth

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Characteristics  
> Alkalinity

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Characteristics  
> Chlorophyll Concentrations

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Characteristics  
> Conductivity

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Characteristics  
> Light Transmission

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Gases > Dissolved  
Oxygen

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Characteristics  
> pH

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Solids > Suspended  
Solids

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Characteristics  
> Turbidity

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Characteristics  
> Water Temperature

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Characteristics  
> Saline Concentration

*Theme Keyword:*

Earth Science > Terrestrial Hydrosphere > Water Quality/Water Chemistry > Water Characteristics  
> Eutrophication

*Place:*

*Place Keyword Thesaurus:* Producer Defined

*Place Keyword:* United States of America

*Place Keyword:* United States

*Place Keyword:* Maryland

*Place Keyword:* Chesapeake Bay

*Place Keyword:* Choptank River

*Place Keyword:* Harris Creek

*Place Keyword:* Talbot County

*Place Keyword:* USA

*Place Keyword:* MD

*Temporal:*

*Temporal\_Keyword\_Thesaurus*: Producer Defined  
*Temporal\_Keyword*: 2019

*Access\_Constraints*: None

*Use\_Constraints*:

Acknowledgement of the MD Department of Natural Resources, Resource Assessment Service as a data source would be appreciated in products developed from these data.

*Point\_of\_Contact*:

*Contact\_Information*:

*Contact\_Person\_Primary*:

*Contact\_Person*: Mark Trice

*Contact\_Organization*:

Maryland Department of Natural Resources, Resource Assessment Service

*Contact\_Position*: Program Chief, Water Quality Informatics

*Contact\_Address*:

*Address\_Type*: Mailing and physical address

*Address*: Tawes State Office Building, 580 Taylor Avenue, D-2

*City*: Annapolis

*State\_or\_Province*: MD

*Postal\_Code*: 21401

*Contact\_Voice\_Telephone*: 410 260-8630

*Contact\_Electronic\_Mail\_Address*:

mark.trice\_nospam\_@maryland.gov[Remove \_nospam\_ for valid email address]

*Browse\_Graphic*:

*Browse\_Graphic\_File\_Name*:

MD DNR Continuous Monitoring Project 2019 Station Map can be found using publication type 'map' to search the 'Monitoring News and Reports' page of the Eyes on the Bay website

<[http://eyesonthebay.dnr.maryland.gov/contmon/stn\\_map/Cmon\\_stns\\_2019.pdf](http://eyesonthebay.dnr.maryland.gov/contmon/stn_map/Cmon_stns_2019.pdf)>

*Browse\_Graphic\_File\_Description*:

Map title: "Maryland Department of Natural Resources Shallow Water Monitoring: Continuous Monitoring Stations 2019". The vertical profiler is listed as "PRO: Choptank River - Harris Creek Profiler" (Station XFG4618).

*Browse\_Graphic\_File\_Type*: PDF

*Data\_Set\_Credit*:

Maryland Department of Natural Resources, Resource Assessment Service staff maintained the profiler and the data sondes, and processed the data. The project was made possible with funding provided by The State of Maryland and the National Oceanic and Atmospheric Administration Chesapeake Bay Program Office.

*Cross\_Reference*:

*Citation\_Information*:

*Originator*:

Maryland Department of Natural Resources, Resource Assessment Service

*Publication\_Date*: 20200317

*Title*: MD DNR Continuous Water Quality Monitoring Project 2019

*Geospatial\_Data\_Presentation\_Form*: Spatial dataset

*Online\_Linkage*:

MD DNR Continuous Water Quality Monitoring Project data for 2019, including the hourly records collected at the Harris Creek profiler and the data collected at the upstream and downstream continuous monitoring stations in Harris Creek, are available through the Continuous Monitoring Data page of the Eyes on the Bay website

## *Data\_Quality\_Information:*

### *Attribute\_Accuracy:*

#### *Attribute\_Accuracy\_Report:*

MD DNR followed specific procedures to ensure that the Vertical Water Quality Profiler Project design was properly implemented and managed with sufficient accuracy, precision, and detection limits. Accuracy (closeness to the true value) of collected data was controlled and assured by the proper use, calibration and maintenance of field equipment for the measurement of physical and chemical parameters. The vertical profiler system consisted of a YSI 6951 pontoon platform fitted with a YSI 6960 Controller Assembly and a YSI 6955 Winch Assembly. A YSI 6600V2-4 monitoring sonde was suspended from the vertical profiler to measure water quality. The YSI 6600V2-4 sonde was configured with the following probes: 6560(conductivity/temperature); 6561(bulb pH) or 6579(tall pH) or 5091(flat pH); 6136(turbidity); 6150ROX (dissolved oxygen); 6025(fluorescence/chlorophyll). Resolution, range and accuracy specifications for the sonde and probes may be obtained from the manufacturer. [<<https://www.ysi.com/products/multiparameter-sondes>>] Procedures used to control and assure the accuracy of field measurements consisted of equipment maintenance, calibration of field instruments, and verification of calibrations. Details of how data acquired with YSI sondes were quality assured and quality controlled may be found in the process description elements in the Lineage portion of this metadata record.

#### *Logical\_Consistency\_Report:*

The vertical profiler conducted profiles every hour beginning at the top of the hour. Profiles were conducted in a "bottom up" manner, with the first reading for each profile sequence taken at 2m below the surface. As the instrument rose through the water column, additional readings were taken at depths of 1.5m, 1.0m, and 0.5m below the surface. The profiler moved to a new depth about every 2 minutes and a complete profile took approximately 8 minutes to complete.

Although the profiler was programmed to collect profile readings at 2.0m, 1.5m, 1.0m, and 0.5m, the actual depths for data collection varied slightly due to wave action and water currents displacing the sonde in the water column. Generally, the depths at which readings were taken were within +/- 0.1m of the programmed depth. During several profile sequences, the recorded time did not advance as the profiler moved to a new depth. In these instances, each depth of the profile sequence is associated with the same time stamp. Profiles with uniform time stamps at each depth are: April 18 (9:54am), June 19 (7:07am), July 30 (7:36am), August 8 (9:11am), August 9 (7:51am), August 16 (6:00am), August 20 (9:43am), August 26 (8:00am), September 3 (6:00am), September 6 (7:00am), September 11 (9:04am), and September 11 (9:14am). The cause of this time recording error is not known, but may be related to manually triggering a profile sequence either remotely or in the field. The vertical profiler recorded hourly readings at 5 minutes before each hour while the sonde was resting in a parked position. At the start of monitoring in 2019, the parked position was set at a depth of 1.5m. However, on March 18, the parked position was changed to a depth 1.0m to be consistent with previous years' monitoring.

#### *Completeness\_Report:*

At first deployment on March 5, 2019, the vertical profiler battery had an extremely low charge. Solar charging of the battery in the field proved insufficient and the instrument conducted only intermittent profiles during the first few weeks of deployment. On March 18 the instrument battery and a failed temperature probe were both replaced. Following the repair, the instrument conducted hourly profiles as scheduled.

On May 30 the telemetry unit on the vertical profiler failed. From May 30 to July 25, the profiler continued to operate, but regular data downloads to the server were absent and personnel were unable to check profiler operation via a remote connection to the instrument. On several occasions during this time period, the vertical profiler stopped conducting profiles. Most often, this happens if the sonde hits bottom during a profile sequence (usually during extreme low tides or windy conditions), but instrument operation can also halt for unknown reasons. Since profiler operation could not be monitored remotely, these operational issues went undetected until a scheduled maintenance visit to the site. Once the sonde was exchanged at the site and/or the instrument was restarted in the field, instrument operation would resume. This scenario resulted in missing records for the periods June 16-19, June 19-25, July 5-11, and July 11-25. Unsuccessful attempts to restore telemetry included replacing the instrument antenna on June 12 and updating all firmware and software on the modem on June 19. Finally, on July 25, the SIM card in the modem was replaced and the telemetry problem was resolved. The profiler continued to operate unreliably and stopped conducting profiles on numerous dates between July 26

and September 3. In all instances, the vertical profiler was restarted remotely once the stoppage was discovered, but not before some profile recordings were missed. On September 3, on the advice of technical support, the vertical profiler was reprogrammed to conduct profiles in a “top down”, rather than a “bottom up”, manner. This created an additional problem whereby the 2.0m depth reading was skipped during each profile sequence. On September 3 from 8:00am through 4:00pm, profiles were conducted from the surface to the bottom with readings at 0.5m, 1.0m and 1.5 m. On September 5, the vertical profiler set up program was returned to a “bottom up” configuration, thus correcting the missed readings at 2.0m. However, operation of the vertical profiler remained erratic, and the instrument continued to randomly stop conducting profiles.

Troubleshooting of operational issues continued, and on September 11 the winch assembly on the vertical profiler was removed to replace the sonde cable. Reinstallation of the winch assembly with a new sonde cable appeared to correct the problems, and the vertical profiler functioned well from September 12 until October 15. From October 15-29 the sonde stopped responding to commands from the profiler, and no profiles were performed during this period. A loose wire on the sonde cable was repaired on October 29 and normal profiler operation resumed.

Beginning on December 8, several instances of missed profiles occurred as power slowly drained from the instrument battery during the last weeks of deployment. Profiler data collection ended on December 20, 2019 when the instrument was removed from Harris Creek to prevent damage due to ice formation.

All other sonde attribute values that are missing from the dataset were censored during the data quality control process. Analysts examined the data and masked values that were determined to be unreliable.

Finally, additional profiles may appear in the data record on dates when DNR field biologists exchanged sondes at the profiler site. During field visits, biologists often triggered a profile to be performed in order to test that the instrument was operating properly. Additional profiles may also appear in the data record when profiles were triggered remotely during troubleshooting exercises.

*Lineage:*

*Process\_Step:*

*Process\_Description:*

**SONDE CALIBRATION and POST-CALIBRATION:** The Yellow Springs Instrument (YSI) 6600V2-4 data sondes were maintained and calibrated before and after each deployment in accordance with YSI recommendations: [<http://www.ysi.com>]. Ecowatch™ software (a YSI product) was used to calibrate the instruments.

**FIELD MEASUREMENTS:** The vertical profiling system consisted of the YSI 6951 pontoon platform fitted with the YSI 6960 Controller assembly and the YSI 6955 Winch assembly. A YSI 6600V2-4 data sonde was suspended from the profiler system to monitor water quality. The monitoring sonde at the profiler site recorded seven water quality parameters at each 0.5 meter depth of the vertical profile. Profiles were conducted every hour, with new depth and parameter readings recorded approximately every 2 minutes. Along with depth, the seven water quality parameters measured were: water temperature, specific conductance (used to calculate salinity), dissolved oxygen concentration, oxygen percent saturation, turbidity (NTU), fluorescence (used to estimate chlorophyll), and pH.

The YSI 6600V2-4 sonde was configured with the following probes:

6560(conductivity/temperature); 6561(bulb pH) or 6579(tall pH) or 5091(flat pH); 6136(turbidity); 6150ROX(dissolved oxygen); 6025(fluorescence/chlorophyll). The sonde logged data onto a Campbell Scientific CR1000 datalogger, and the data were stored on the CR1000 until retrieval. The station was equipped with a cellular telemetry unit, which allowed data to be accessed remotely and transmitted to a server computer at DNR. Data were retrieved every hour and made available publicly on DNR's web site [<http://www.eyesonthebay.net>].

**SONDE DATA CHECKS:** The monitoring sonde was retrieved, calibrated, and replaced once during March 2019, November 2019, and December 2019; and bi-weekly during April 2019, May 2019, June 2019, July 2019, August 2019, September 2019, and October 2019. At each deployment, sondes were replaced with clean, recalibrated units. Dates of sonde replacement in 2019 were: March 5 (initial deployment), April 2, April 18, May 9, May 29, June 12, June 25, July 11, July 25, August 8, August 21, September 12, September 25, October 10, October 29, and November 21. The sonde, along with the entire vertical profiler unit, was removed and not replaced on December 20, 2019.

In the field, before an instrument was replaced, field biologists allowed both the new (freshly calibrated) sonde and the old (deployed) sonde to log simultaneous readings side by side at the same depth. In addition, data were recorded from a discrete instrument - usually a HydroLab sonde. This three-way comparison assured that the "new" and "old" sondes were both reading each parameter



within a certain tolerance. The HydroLab reading was used as a "double-check", and since it was a discrete reading, it allowed biologists to watch the display and note whether the parameters were fluctuating or stable.

Data were evaluated using both three-way in-situ comparison results and data from sonde calibrations. The comparison tolerances were as follows for both pre- and post-calibration and in-situ comparisons: Temperature (degrees C) +/- 0.2; Specific Conductance (uS/cm) +/- 5%; Dissolved Oxygen (mg/l) +/- 0.5 mg/l; pH +/- 0.2; Turbidity (NTU) +/- 5% or 5.0 NTU (whichever is greater); Chlorophyll (ug/l) +/- 5% or 5.0 ug/l (whichever is greater). Excessive drift between pre- and post- calibration values of sonde probes, variance from in-situ measurements or probe failures caused data to be flagged. When post-calibration drift exceeded the limits stated above in both the post-calibration and the in-situ comparables, the questionable data were masked within the data set with an error code.

*Process\_Date:* Unknown

*Process\_Contact:*

*Contact\_Information:*

*Contact\_Person\_Primary:*

*Contact\_Person:* Kristen Heyer

*Contact\_Organization:*

Maryland Department of Natural Resources, Resource Assessment Service

*Contact\_Position:* Program Manager, Monitoring Field Office

*Contact\_Address:*

*Address\_Type:* mailing and physical address

*Address:* 1919 Lincoln Drive

*City:* Annapolis

*State\_or\_Province:* Maryland

*Postal\_Code:* 21401

*Country:* USA

*Contact\_Voice\_Telephone:* 410 263-3369

*Contact\_Electronic\_Mail\_Address:*

Kristen.Heyer\_nospam\_@maryland.gov[Remove \_nospam\_ for valid email address]

*Process\_Step:*

*Process\_Description:*

Data downloaded from the sonde were subjected to quality assurance/quality control checks to ensure that values outside the range of possibility were identified in the published dataset. Loggernet™ software (a Campbell Scientific product [<http://www.campbellsci.com>]) was used to download the data collected by the profiler. Using SAS statistical software, the "raw" .txt file of sonde data was queried to select dates that corresponded with each sonde deployment. Also, data columns were rearranged to achieve a format expected by an Excel® macro used for post-processing. The resulting data file was saved as a .csv file.

Each .csv file of sonde data was then post-processed using the aforementioned Excel® macro. The file was opened and renamed. Rows of data acquired before and after deployment were deleted. Records (if any) were also deleted if instrument error codes indicated invalid data. The macro rearranged columns and inserted error-tracking columns and headings. Macro statements flagged negative values, missing values and highlighted values outside each parameter's normal range. The macro also returned a report summarizing range exceedances. Event and instrument information was appended to each record.

Flagged values were evaluated. Common anomalies included spikes in fluorescence and turbidity, dips in specific conductance, and high dissolved oxygen readings. Instrument post-calibration results, in-situ comparisons with HydroLab readings, LI-COR readings, historical data from nearby locations, and survey crew remarks were used to determine whether sensor values were acceptable. In cases where data were determined to be unreliable, the reason(s) were documented with error codes and comments. Unreliable data were masked. No data were discarded. Only data considered

reliable were published in reports.

MD DNR scientists reviewed profiler monitoring data weekly. If a problem was identified, a field biologist was dispatched to address the issue as soon as possible.

**VERIFICATION AND DATA MANAGEMENT** At the end of the monitoring season, DNR data analysts and field biologists conducted additional data QA/QC procedures. All of the data were plotted and outliers and anomalous values were thoroughly researched. Staff compared unusual values to historic values from the site and values from nearby sites in the Bay. Weather events were considered, event logs were reviewed and field staff were consulted regarding possible legitimate causes for the values. In cases where values were not considered legitimate, error codes were assigned. All data were retained in the archive data set. After field staff and the Quality Assurance Officer reviewed error flags, the values were masked within the published dataset.

*Process\_Date:* Unknown

*Process\_Contact:*

*Contact\_Information:*

*Contact\_Person\_Primary:*

*Contact\_Person:* Mark Trice

*Contact\_Organization:*

Maryland Department of Natural Resources, Resource Assessment Service

*Contact\_Position:* Program Chief, Water Quality Informatics

*Contact\_Address:*

*Address\_Type:* mailing and physical address

*Address:* Tawes State Office Building, 580 Taylor Avenue, D2

*City:* Annapolis

*State\_or\_Province:* Maryland

*Postal\_Code:* 21401

*Country:* USA

*Contact\_Voice\_Telephone:* 410 260-8630

*Contact\_Electronic\_Mail\_Address:*

mark.trice\_nospam\_@maryland.gov[Remove \_nospam\_ for valid email address]

---

*Spatial\_Data\_Organization\_Information:*

*Indirect\_Spatial\_Reference:* Chesapeake Bay, Maryland, USA

*Direct\_Spatial\_Reference\_Method:* Point

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*Spatial\_Reference\_Information:*

*Horizontal\_Coordinate\_System\_Definition:*

*Geographic:*

*Latitude\_Resolution:* 0.0001

*Longitude\_Resolution:* 0.0001

*Geographic\_Coordinate\_Units:* Decimal degrees

*Geodetic\_Model:*

*Horizontal\_Datum\_Name:* North American Datum of 1983

*Ellipsoid\_Name:* Geodetic Reference System 80

*Semi-major\_Axis:* 6378137

*Denominator\_of\_Flattening\_Ratio:* 298.257

*Vertical\_Coordinate\_System\_Definition:*



## *Depth\_System\_Definition:*

*Depth\_Datum\_Name:* No correction  
*Depth\_Resolution:* 0.001  
*Depth\_Distance\_Units:* meters  
*Depth\_Encoding\_Method:* Attribute values

---

## *Entity\_and\_Attribute\_Information:*

### *Overview\_Description:*

#### *Entity\_and\_Attribute\_Overview:*

This metadata record is a description of a vertical profiler water quality monitoring project in Harris Creek, a tidal tributary of the Chesapeake Bay. Water quality data were collected at 0.5 meter depth intervals at a single station (XFG4618) during 2019.

The data are comprised of the attributes: *SAMPLE\_DATE*: date (month/day/year) *SAMPLE\_TIME*: Eastern Standard Time, 24 hour format (hour:minutes) *STATION*: station name (text) *SONDE*: sonde identifier (text) *TOTAL\_DEPTH*: depth below water surface (meters) *BATT*: battery charge (Volts) *WTEMP*: water temperature (degrees Celsius) *SPCOND*: specific conductance (micro Siemens per centimeter) *SALINITY*: salinity (parts per thousand) *DO\_SAT*: dissolved oxygen percent saturation (percent) *DO*: dissolved oxygen (milligrams per liter) *PH*: pH (pH units) *TURB\_NTU*: turbidity (Nephelometric Turbidity Units) *FLUOR*: fluorescence (Relative Fluorescence Units) *TCHL\_PRE\_CAL*: chlorophyll (micrograms per liter) *CHLA*: No data - all data values blank *COMMENTS*: comments (text)

#### *Entity\_and\_Attribute\_Detail\_Citation:*

The Vertical Water Quality Profiler Project was conducted in a manner consistent with the procedures established for the MD DNR Shallow Water Monitoring Program. Data users who desire very detailed information about data-definition, sampling-procedures, and data-processing are encouraged to refer to the document listed below.

"Quality Assurance Project Plan for the Maryland Department of Natural Resources, Chesapeake Bay Shallow Water Quality Monitoring Program, for the period July 1, 2019 - June 30, 2020", can be found using publication type 'Quality Assurance Project Plan' to search the 'Monitoring News and Reports' page of the Eyes on the Bay website  
<[http://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/SWM\\_QAPP\\_2019\\_2020\\_Draft\\_v3.pdf](http://eyesonthebay.dnr.maryland.gov/eyesonthebay/documents/SWM_QAPP_2019_2020_Draft_v3.pdf)>.

---

## *Distribution\_Information:*

### *Distributor:*

#### *Contact\_Information:*

##### *Contact\_Person\_Primary:*

*Contact\_Person:* Mark Trice

*Contact\_Organization:*

Maryland Department of Natural Resources, Resource Assessment Service

*Contact\_Position:* Program Chief, Water Quality Informatics

*Contact\_Address:*

*Address\_Type:* mailing and physical address

*Address:* Tawes State Office Building, 580 Taylor Avenue, D-2

*City:* Annapolis

*State\_or\_Province:* Maryland

*Postal\_Code:* 21401

*Country:* USA

*Contact\_Voice\_Telephone:* 410 260-8630

*Contact\_Electronic\_Mail\_Address:*

mark.trice\_nospam\_@maryland.gov[Remove \_nospam\_ for valid email address]

*Resource\_Description:* Downloadable data

*Distribution\_Liability:*

None of the Maryland Department of Natural Resources (MD DNR) partners or any of their employees, contractors, or subcontractors makes any warranty, expressed or implied, nor assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information or data contained within the web site. Reference to any specific commercial products, processes, or services or the use of any trade, firm, or corporation name is for the information and convenience of the public and does not constitute endorsement, recommendation or favoring by MD DNR partners.

*Standard\_Order\_Process:*

*Digital\_Form:*

*Digital\_Transfer\_Information:*

*Format\_Name:* ASCII file, formatted for text attributes, declared format

*Format\_Information\_Content:* Vertical profiler monitoring sonde data

*File-Decompression\_Technique:* No compression applied

*Digital\_Transfer\_Option:*

*Online\_Option:*

*Computer\_Contact\_Information:*

*Network\_Address:*

*Network\_Resource\_Name:*

[<<http://eyesonthebay.dnr.maryland.gov/contmon/VerticalProfilerData.cfm>>]

*Access\_Instructions:*

Vertical profiler data (sonde data) are available through the vertical profiler data download page of the MD DNR "Eyes on the Bay" website. Access sonde data through the link provided under "Network Resource Name" in this metadata record. A file containing one week of data is approximately 110 kb in size with download times dependent upon computer connection speed.

The complete record of vertical profiler data for 2019, including masked data values, error codes, and comments, can also be obtained from the MD DNR Resource Assessment Service. Contact information is provided in the "Distributor" portion of this metadata record.

*Fees:* None

---

*Metadata\_Reference\_Information:*

*Metadata\_Date:* 20200414

*Metadata\_Contact:*

*Contact\_Information:*

*Contact\_Person\_Primary:*

*Contact\_Person:* Diana Domotor

*Contact\_Organization:*

Maryland Department of Natural Resources, Resource Assessment Service

*Contact\_Address:*

*Address\_Type:* mailing and physical address

*Address:* Tawes State Office Building, 580 Taylor Avenue, D2

*City:* Annapolis

*State\_or\_Province:* Maryland

*Postal\_Code*: 21401

*Country*: USA

*Contact\_Voice\_Telephone*: (410) 260-8630

*Contact\_Electronic\_Mail\_Address*:

diana.domotor\_nospam\_@maryland.gov[Remove \_nospam\_ for valid email address]

*Metadata\_Standard\_Name*: Content Standards for Digital Geospatial Metadata

*Metadata\_Standard\_Version*: FGDC-STD-001-1998